REMARKS

When applicants' attorney was unable to reach Examiner Raymond, SPE Mark Huff granted a telephone interview on July 24, 2008, to discuss the Examiner's refusal to accept applicants' Declaration of Prior Invention Under 37 C.F.R. § 1.131 with respect to the Kirkpatrick et al. reference. Applicants' attorney would like to thank SPE Huff for the telephone interview granted on July 24, 2008.

Claim Rejection Under 35 U.S.C. § 103(a)

Claims 1 - 6, 8, 9, 11 - 13, and 15 - 17 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over Kirkpatrick (U.S. Patent Application 2006/0084229; now U.S. Patent No. 7,018,925 B2) in view of Itoh (U.S. Patent Application 2004/0058279).

The Kirkpatrick '925 patent describes and claims a method of fabricating a dual gate semiconductor device which includes a nitridated, high voltage dielectric within a low voltage region. In one aspect, the method comprises forming a nitridated, high voltage gate dielectric layer over a semiconductor substrate, patterning a photoresist over the nitridated, high voltage gate dielectric layer, wherein the patterning leaves an accelerant residue on the exposed nitridated, high voltage gate dielectric layer, and subjecting the exposed nitridated, high voltage dielectric to a high vacuum to remove the accelerant residue. (Abstract)

This reference is not related to the subject matter of applicants' invention, which relates to the fabrication of a photomask. There is nothing in the Kirkpatrick reference which suggests that a vacuum be applied during patterning of a photoresist on a photomask surface, as a method of improving sidewall roughness of the patterned photoresist. There is nothing in the Kirkpatrick reference which suggests that the critical dimensions and uniformity of a patterned photomask layer (such as a chrome layer) can be improved by applying a vacuum during patterning of a photoresist on the photomask surface.

In more detail, Col. 4, lines 58 - 67, continuing at Col. 4, lines 1 - 3, the Kirkpatrick et al. reference recites the following: "The present invention uniquely recognizes that a nitridation of a HV (High Voltage) dielectric layer and subsequent patterning of a photoresist over a LV (Low Voltage) region leaves an accelerant residue that, based on observations, effectively increases or enhances the etch rate of a wet etchant such that the etchant significantly etches into the silicon substrate lying under the accelerant residue. It has presently been found that when the wet etch is conducted on an exposed nitridated, HV gate dielectric layer in the LV region, the accelerant residue, if not removed, enhances the etching rate of the etchant such that it etches into the silicon and roughens the silicon surface at a rate greater than it normally would if the accelerant residue were not present". At Col. 4, lines 49 - 54, the Kirkpatrick et al. reference recites the following: "While the chemical composition of the accelerant residue or the chemical reactions with the etchant and silicon substrate are not presently known, . . . the present invention recognizes the presence of the accelerant residue and presents a unique method for removing it."

A reading of the Kirkpatrick reference makes it clear that the invention relates to a method of removing a chemical (accelerant residue) from a silicon surface of a semiconductor substrate during device fabrication. The accelerant residue is removed so that a wet etchant subsequently applied to the device surface will not etch more rapidly into the silicon substrate lying under the accelerant residue.

The Itoh Patent Application (Please see corresponding earlier filed and issued U.S. Patent No. 6, 660,455 B2) relates to a problem of constantly changing size of a latent (undeveloped) pattern which is being written into a photoresist using a direct write process. This change in dimension of the written latent pattern with time during writing is significant because it takes a long period of time (8 - 20 hours) to direct write (write with an electron beam, for example) an entire pattern over a photoresist surface. The Itoh reference describes a specialty material for use in pattern formation (a photoresist material) for electron beam lithography,

which contains an alkali-soluble resin, a photoacid generator and dissolution inhibiting groups. One dissolution inhibiting group increases the sensitivity of the pattern formation material in the photoresist, while the other dissolution inhibiting group decreases the sensitivity while the pattern formation material is standing in the vacuum which is present during electron beam irradiation of the photoresist. In the invention, the ratio of the first dissolution inhibiting group to the second dissolution inhibiting group is adjusted so the size of an alkali-soluble portion of the pattern formation material is substantially held constant independent of the time the material is held under the vacuum condition which is present during writing of the pattern. (Abstract) That is to say that the amount of time required to write the image, using an e-beam in a system does not affect the size of the pattern which is written, regardless of the time required to write the pattern. ('455 Patent, Col. 3, lines 38 - 65.)

The Itoh reference does not even suggest that after the pattern is completely written, the photoresist be treated with a vacuum to alter the structure of the patterned image in the photoresist. The Itoh reference does not even suggest applicants' invention. Applicants' invention relates to vacuum treatment of a photomask with an already patterned photoresist on its surface, as a method of reducing the sidewall roughness of a developed pattern in the photoresist (whereby the critical dimension uniformity across the patterned photoresist, and in the chrome layer subsequently etched using the photoresist are improved).

Applicants' invention enables an unexpected improvement in critical dimension uniformity in the photomask patterned layer (typically chrome). The inventors explained at Paragraph 14 of their application, with respect to the embodiment of the invention claimed in independent Claim 1, that they had discovered that application of a vacuum to a pattern imaged photoresist (irradiated but not developed) could be used to improve the critical dimension and uniformity of a subsequently etched patterned chrome layer in the photomask. The vacuum is applied after completion of the pattern writing, but prior to patterning of the chrome layer. Neither of the

references cited in rejecting the claims suggest application of vacuum to a completely imaged photoresist on the surface of a photomask for purposes of improving the patterning of an underlying chrome layer.

In addition, the inventors explained at Paragraph 19 of their application, with respect to the embodiment of their invention claimed in independent Claim 8, that they discovered that exposure of the developed photoresist to vacuum results in an improvement in the line edge roughness of pattern openings that have been formed through the photoresist layer thickness during development. It is theorized, but not intended as a limitation, that the surface tension in the patterned resist may allow for 'pulling together' of the surface, which may smooth out sidewall roughness. Neither of the cited references suggest application of vacuum to a developed, patterned photoresist present on the surface of a photomask to improve the patterning of an underlying chrome layer.

Applicants are not removing an accelerant residue from the surface of a silicon substrate during fabrication of a semiconductor device. Applicants are not improving the performance of a pattern formation material used in a photoresist. Applicants are improving the shape and sidewall roughness of a patterned photoresist which is subsequently used during etching of an underlying chrome layer which is part of a photomask structure.

The general steps of fabrication of a photomask prior to applicants' invention were described in their "Invention Alert", a copy of which was submitted with their §1.131 Declaration regarding the Kirkpatrick reference. At the bottom of Page 3 and top of Page 4 of the "Invention Alert" applicants describe the previous fabrication process which was used prior to their invention: 1. The photomask plate (comprised of glass with an overlying chrome layer)is coated with (photo)resist, followed by post application baking (PAB) of the applied photoresist. This is followed by exposure of the photoresist to radiation (electron beam or laser) to direct write a pattern onto the photoresist. 2. The photomask is post-exposure baked (PEB) and

developed to remove a portion of the resist from the plate, leaving a pattern of open area on the plate. 3. The photomask structure is then etched, whereby the pattern in the photoresist is transferred into an underlying chrome layer in the photomask structure. The inventors' new and non-obvious method was the use of vacuum to alter the composition and dimension of photoresist features of a photomask prior to etching of the underlying chrome layer, as described at Pages 6 and 7 of the Invention Alert, under item 8.

Out of the tens of thousands of references related to semiconductor processing, one of skill in the art would not have any reason to combine the Kirkpatrick reference which relates to formation of a nitridated high voltage gate dielectric layer over a silicon substrate with the Itoh et al. reference which relates to a specialized pattern formation material used in a photoresist. The Examiner has not made a prima facie case for the combination of these references. As opined in *Uniroyal, Inc. v. Rudkin-Wiley Corp.* 837 F.2d 1044, 5 U.S.P.Q.2d 1434, 1438 (Fed. Cir. 1988), "When prior-art references require a selective combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. Something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. It is impermissible to use the claims as a frame and the prior-art references as a mosaic to piece together a facsimile of the claimed invention".

However, even if the teachings of these references are combined, there is no suggestion of applicants' invention. The only common feature of the cited references is the presence of a vacuum at some point in a process. With respect to the Kirkpatrick reference a vacuum is applied to remove an undesirable chemical from the surface of a silicon wafer. With respect to the Itoh et al. reference, the composition of a photoresist imaging material used to prepare photomasks is altered so that it will perform better during writing of a pattern on a photomask, where the writing is carried out under vacuum conditions. Both of these applications of vacuum are patentably distinct from the present invention.

The Examiner is respectfully requested to withdraw the rejection of Claims 1 - 6, 8, 9, 11 - 13, and 15 - 17 under 35 U.S.C. § 103 (a) as being unpatentable over Kirkpatrick (U.S. Patent Application 2006/0084229; now U.S. Patent No. 7,018,925 B2) in view of Itoh (U.S. Patent Application 2004/0058279).

Applicants' Declaration Under 37 C.F.R. § 1.131:

The Kirkpatrick et al. application, which was published on April 20, 2006 (as Pub. No. 2006/0084299), was filed on December 2, 2005, while the present application was filed on April 2, 2004. 35 U.S.C. § 102 (a), as incorporated into 35 U.S.C. § 103 for purposes of priority, requires that, to be eligible as prior art, a referenced description must be patented or described in a printed publication in this or a foreign country before the invention of the subject matter described by the applicant for patent. In the present instance, as applicants discussed in their Amendment "A", the published application cited by the Examiner claims priority under U.S. Application No. 10/752,885, which was filed on January 6, 2004; however, this application was not published until December 30, 2004, and did not issue as a patent until March 28, 2006. Therefore this reference does not qualify as prior art under 35 U.S.C. § 102(a) against the subject matter described in the present application, which was filed (and therefore invented prior to) April 2, 2004. Further, Provisional Application 60/438,112, from which Application No. 10/752, 885 claims priority also does not qualify as prior art under 35 U.S.C. §102 (a) because the provisional application did not issue as a patent and was not described in a printed publication as required. Thus, the application which was published on April 20, 2006 does not qualify as a prior art reference under 35 U.S.C. §103(a), as previously discussed by applicants.

In this instance, U.S. Application No. 10/752,885, which issued as U.S. Patent No. 7,018,925 on March 28, 2006, which application was filed on January 6, 2004, would qualify as a reference under 35 U.S.C. §102(e)(2). With respect to 35 U.S.C. §102(e)(2), the invention

must be described in a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent. Applicants originally reserved the right to file a declaration swearing that their invention was made prior to January 6, 2004, in the event the Examiner did not see the distinctions between the technology in the Kirkpatrick et al. disclosure and applicants' invention.

The Examiner continued to argue that the Kirkpatrick et al. disclosure in combination with other various references rendered applicants invention obvious. On February 25, 2008, applicants filed a Declaration Under 37 C.F.R. §1.131 to establish that the Kirkpatrick et al. application is not prior art to the present invention. The Examiner refused to accept the Declaration on grounds that the signature of a portion of the inventors was missing from the Declaration. Applicants petitioned for acceptance of the Declaration without the signature of all of the inventors due to inability to locate some of the inventors. After additional efforts by applicants and the provision of data to the Petitions Examiner, the petition was granted on March 20, 2008.

Applicants subsequently filed an Amendment "D" Under 37 C.F.R. §1.111 in which applicants relied upon the Declaration to show that the Kirkpatrick et al. reference was not prior art. This time the Examiner refused to accept the Declaration on grounds that the Declaration was ineffective because the evidence provided did not adequately support applicants' assertion that the invention as claimed was in the hands of the inventors prior to the critical date with respect to the Kirkpatrick et al. reference.

Applicants' attorney attempted to contact Examiner Raymond on several occasions but was not able to reach her, and there was no response to phone mails which were left. Applicants' attorney then contacted the Examiner's SPE, Mark F. Huff, to determine whether Examiner Raymond was on leave or unavailable. Mr. Huff reviewed the file and discussed the Declaration Under 37 C.F.R. §1.131 with applicants' attorney. The Examiner had argued that Claim 1 recited a pressure range which was not specifically present in the "Invention Alert" of applicants

which had been supplied as supporting evidence for the Declaration. Further, the Examiner had argued that the failure of the applicants to provide a pressure range in the Alert indicated that the pressure of the system may not have been important at the time of preparation of the Alert. SPE Huff commented that the pressure range was a rather broad pressure range. Applicants' attorney suggested that the precise amount of vacuum applied is not controlling, since the amount of vacuum applied can be varied (depending on the time, temperature, and the photoresist material) and still have the invention work. One of skill in the art can determine what the vacuum range should be by experimentation once the concept disclosed in the application is known. The most important teaching of the invention is the concept of treating a pattern irradiated (exposed) photoresist on a photomask surface or the treatment of the developed photoresist with a vacuum prior to use of the patterned photoresist. The patterned photoresist is subsequently used to etch through an underlying chrome layer on the photomask. Applicants' vacuum treatment of the patterned photoresist leads to a very important improvement in the etched feature critical dimension uniformity in the photomask.

Further, applicants' attorney pointed out to SPE Huff that the reason the range of the vacuum was not specified in the Invention Alert was because the Alert provided the names of various processing tools in which the invention might be carried out, and the vacuum range capabilities of these tools were known in the art. In addition, the applicants widened the vacuum range recited in the application to encompass the vacuum ranges of tools generally known in the semiconductor processing art at the time, so that their claimed invention could not easily be avoided.

SPE Huff recommended that applicants prepare an Amendment After Final Rejection which included additional evidence as to the vacuum ranges for the tools described in applicants' Invention Alert, as well as any other information showing art which was generally available at the time of preparation of the Invention Alert.

Applicants consider the subject matter of their claimed invention to be distinguishable over the Kirkpatrick reference for the reasons provided above with respect to the rejection of the claims in general. It is not crucial that applicants' Declaration Under 37 C.F.R. §1.131 be accepted for a patent to issue under the present application. However, because applicants do not consider this reference to be prior art (and may want to argue this if an appeal is necessary), applicants are providing additional evidence supporting their Declaration herewith. Applicants have obtained a copy of the maintenance manual for the Tetra II Photomask Etch Chamber which was available to those skilled in the art in April of 2003. This was one of the tools referred to by applicants in their Invention Alert. The maintenance manual is 92 pages long. Applicants' attorney has selected 11 pages from the manual to submit as an attachment to the present Response "E" After Final Rejection.

These select pages show that the Tetra II Photomask Etch Chamber pressure could be adjusted to vacuum conditions ranging from about 5×10^{-2} mTorr to about 200 mTorr. The selected pages also show that the temperature of substrates in the etch chamber could be adjusted to range from about 13 °C to about 80 °C. Various claims pending in the present application recite that the method of the invention may be carried out at a vacuum ranging from about 5×10^{-6} mTorr to about 5 mTorr, and at a temperature ranging from about 18 °C to about 60 °C. While the temperature range cited falls within the temperature range of the Tetra II Photomask Etch Chamber, the vacuum range of this particular processing chamber has a maximum vacuum of about 10^{-2} mTorr, while the claim range extends to 10^{-6} mTorr. As previously explained, at the time of preparing the patent application, the inventors adjusted the vacuum range to include the vacuum range of other semiconductor manufacturing chambers in which their method might be carried out (so that their claimed invention could not be easily avoided). For example, at the time the Invention Alert was written, Applied Materials, Inc. manufactured and sold a physical vapor deposition apparatus which provided a pressure in the processing chamber which ranged

from about 10^{-6} Torr (10^{-3} mTorr) to about 10^{-9} Torr (10^{-6} mTorr). Please see U.S. Patent No. 6,033,483, issued March 7, 2000, at Col. 1, lines 56 - 57, for example.

Applicants contend that their Declaration is adequately supported by the evidence present in their Invention Alert combined with the general knowledge of one of skill in the art at the time their Invention Alert was authored, and that the Kirkpatrick reference is not prior art to the present invention.

Summary:

Applicants contend that whether or not the Examiner considers the Kirkpatrick reference to be prior art, the claimed subject matter is patentably distinct from the subject matter disclosed in the Kirkpatrick reference. However, for purposes of appeal, if necessary, applicants maintain that the Kirkpatrick reference is not prior art under 35 U.S.C. §103 with respect to their invention.

Applicants contend that the claims as amended herein are allowable, and the Examiner is respectfully requested to pass the application to allowance.

If the Examiner would like to discuss any of the issues with respect to patentability of the amended claims, the Examiner is invited to contact applicants' attorney at the telephone number provided below.

Respectfully submitted,

Shirley L. Church

Shirley L. Church
Registration No. 31,858
Attorney for Applicants
(858) 587-6633

Correspondence Address:
Shirley L. Church, Esq.
P.O. Box 81146
San Diego, CA 92138

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ETEC SYSTEMS AN APPLIED MATERIALS COMPANY

Tetra II Photomask Etch Chamber

Maintenance Manual

April 2003 Revision 001

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1 Overview

This manual contains maintenance procedures for the TETRA II Photomask Etch chamber.

Chapter 15, Preventive Maintenance (PM) Checklists presents a schedule for periodic tasks explained in the checklists, in the software-help files, or in this chapter.

NOTE

These procedures describe the maintenance of a single TETRA II chamber.

The removal, wet cleaning, and reinstallation of the chamber swap kit are the primary maintenance operations required after normal processing.

The following topics are included in this manual:

- Swap Kit and Wet Clean Operations
  - Chapter 3, Swap Kit Removal and Installation
  - Chapter 4, Swap Kit Wet Clean
- Related Maintenance Procedures
  - Chapter 5, Foreline Isolation Valve Test
  - Chapter 6, Chamber Turbo Pump Maintenance Recommendations
  - Chapter 8, Chamber Turbo Pump Purge Verification
  - Chapter 9, Manometer Setup
  - Chapter 10, Endpoint Adjustment
  - Chapter 11, LTA Verification
  - Chapter 12, O-ring Cleaning and Inspection
  - Chapter 13, Corrective Maintenance Procedures
- Repair Procedures
  - Chapter 14, Preventive Maintenance (PM) Checklists

See the following safety, setup, schematics, and operating procedures for the TETRA II:

- *TETRA II Chamber Safety Manual*
- *TETRA II Chamber Startup Manual*
- *TETRA II Chamber Schematics Manual*
- *TETRA II Chamber Site and System Preparation Specification (SSPS), Appendix H, Torque Tables*
- Chapter 15, Preventive Maintenance (PM) Checklists (this manual)

Read and understand the safety precautions in the before performing any maintenance procedure.

See the Applied Dictionary for definitions of acronyms and terms. [http://agu/lib/resources.php?imgdown=1&parent_type_id=2020].

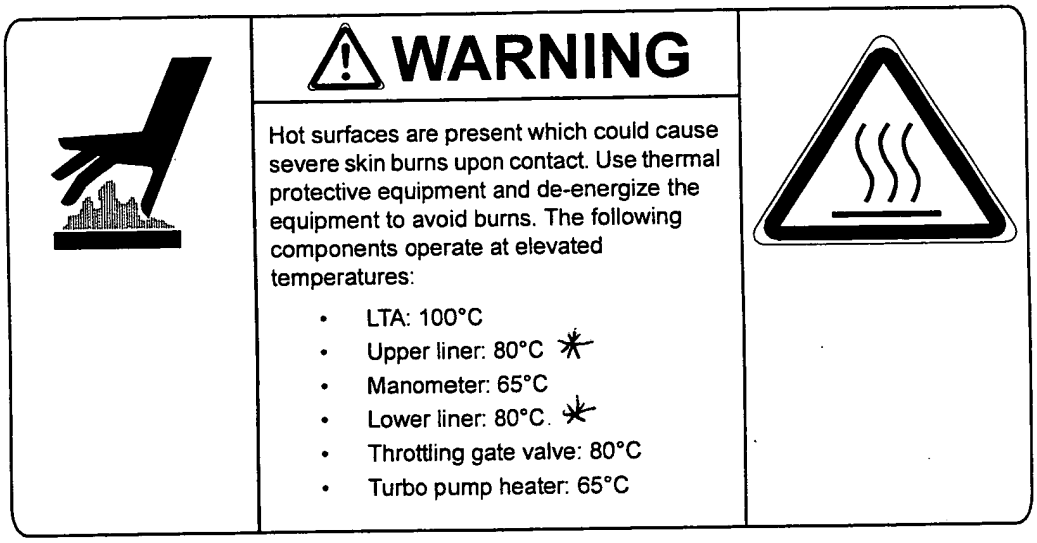
The following sections describe the removal of the components (see Figure 3-3) listed in the sequence indicated:

1. Throttling gate valve
2. Lid temperature assembly
3. Upper chamber liner
4. Lower chamber liner
5. Cathode liner

3.9.1 Preparation

Before beginning chamber disassembly, perform the following tasks:

1. Verify that the process chamber is offline (see Section 3.7).
2. Verify that the chamber is vented (see Section 3.8).



NOTE

Lockout/tagout procedures are provided in Chapter 2, "Safety."

3. Lockout/tagout the AC power to the LTA at CB 2 located on the temperature control.
4. Lockout/tagout the AC power to the source RF power supply (CB 219) and the bias RF power supply (CB 213).

3.14.2 Chamber Turbo Pump Purge Verification

Before beginning the procedure listed in Section 3.14.4, turn on the backing pump and verify that the foreline base pressure goes below 15 mTorr with the isolation valve and the roughing valve closed. After pumping down the chamber, verify that enabling the turbo purge causes the vacuum in the foreline to rise at least 20 mTorr (see Chapter 9, Manometer Setup).

3.14.3 Helium Cooling Maintenance

Perform the procedure presented in Chapter 7, Leakcheck (Helium Trace).

3.14.4 Chamber Pumpdown

Use the following steps to pump down the TETRA II chamber.

1. Leak check the seal between the throttling gate valve and the bonnet cover, using a leak detector and helium tracer gas.
2. From the Ch x header, select the desired chamber.
3. From the menu, select CHAMBER SERVICES.
4. From the Chamber Services screen, select the PROCESS button.
5. From the menu, select SELECT SERVICES.
6. From the menu, select PUMPDOWN.
7. Select ACTIVATE to begin the pumpdown of the Process Chamber.
8. Open and close the throttling gate valve several times to exercise its seal.
9. Close the throttling gate valve while leaving the foreline isolation valve open and wait for the foreline pressure to stabilize.
10. Open the vent valve momentarily so that the chamber pressure rises to a value between 50 mTorr and 200 mTorr. ✳
11. Monitor the foreline pressure. A rise in foreline pressure indicates that there is a leak in the throttling gate valve seal.
12. Allow the chamber to pump down. Typical base pressure is 0.1 mTorr. ✳

3.14.5 Activating the LTA

Follow this procedure to return the LTA to operation:

1. Remove the lockout/tagout of the RF power supply circuit breakers, CB 213 and CB 219.
2. Remove the lockout/tagout of CB 2 for the LTA and set the lid temperature to the process setpoint.
3. Increase the wall and cathode temperature setpoints to their process values.
4. Verify that the turbo pump is at full rotational speed and that all interlocks are met.
5. Verify that the lid temperature reaches the setpoint.

11. Verify the following flows and temperatures, and record the actual values in Table 14-3.

Table 14-3. Flow and Temperature Verification

	Cooling Water Flow		Temperature	
Thermo-con POU	1.0 gpm – 5 gpm	_____	13 °C – 29 °C	_____
Neslab Steelhead-1	2.0 gpm– 5 gpm		17 °C– 22 °C	
AMAT 1	2gpm – 8 gpm	_____	17 °C – 22 °C	_____

12. Check that the flowmeter on the deionizer loop on the front panel of the AMAT-1 heat exchanger indicates 6.0 gph–7.0 gph.

13. Check that the CDA pressure to the AMAT-1 heat exchanger is 90 psi ± 5 psi.

14. For each chamber installed on the system, verify the following and record the results in the following tables:

Table 14-4. Chamber Pumps Verification / All Chambers

Chamber A	Gas Ballast Boost		2/3 Interstage Purge	
QDP80	25 slm ± 2 slm	_____	10 slm ± 1 slm	_____
QDP40	20 slm ± 2 slm	_____	5 slm ± 1 slm	_____

Table 14-5. Chamber Pumps Verification / All Chambers

Chamber B	Gas Ballast Boost		2/3 Interstage Purge	
QDP80	25 slm ± 2 slm	_____	10 slm ± 1 slm	_____
QDP40	20 slm ± 2 slm	_____	5 slm ± 1 slm	_____

Table 14-6. Chamber Pumps Verification / All Chambers

Chamber C	Gas Ballast Boost		2/3 Interstage Purge	
QDP80	25 slm ± 2 slm	_____	10 slm ± 1 slm	_____
QDP40	20 slm ± 2 slm	_____	5 slm ± 1 slm	_____

Table 14-7. Chamber Pumps Verification / All Chambers

Chamber D	Gas Ballast Boost		2/3 Interstage Purge	
QDP80	25 slm ± 2 slm	_____	10 slm ± 1 slm	_____
QDP40	20 slm ± 2 slm	_____	5 slm ± 1 slm	_____

14.3 Monthly PM Checklist

This section describes the monthly PM checklist.

NOTE

After completing this PM schedule, record the necessary information in the checklist signoff log. See Table 14-8.

Table 14-8. Monthly PM Checklist Signoff Log

Performed by	Date	Start Time	Finish Time

NOTE

Review the PM checklists included in the *Centura 300 mm Maintenance Manual*. Perform the periodic maintenance tasks scheduled for the mainframe in conjunction with the chamber maintenance tasks provided here.

1. Perform the Daily and Weekly PMs.
2. Check the calibration of the bias RF generator and source RF generator on each TETRA II chamber. Recalibrate the generators as necessary. The generator should be calibrated to within 1% of the Power Meter Reading and the Forward Reading should be within 2% of the Power Meter Reading.
3. Vent the transfer chamber and perform leak rates on the process chambers. The cathode should be in PROCESS position and final gas valve should be open during this check. The leak rate should not exceed 1.0 mTorr/min. for TETRA II chambers.
4. Verify that the ion gauge on each TETRA II chamber is reading below 10^{-5} Torr. After the chamber has been under vacuum for at least 2 hours, verify that the manometers are stable. Verify that the upper and lower chamber purge are off. Verify that the zero offset (Δ) on the software screen is set to zero. Adjust the zero setpoint potentiometer on the 100 mTorr manometer so that it reads between 0.2 mTorr and 0.3 mTorr. Use the auto zero routine, or manually adjust Δ, to bring the reported chamber pressure to 0.05 mTorr.
5. Verify that test point A on the dual manometer reads 5.0 V ± 20 mV and test point B reads 9.62 V ± 20 mV. Adjust if necessary.
6. Check the fluid level of all Heat exchangers and chillers.